

AMENDMENTS

Please cancel claims 22-23 without disclaimer or prejudice.

Please amend claims 7, 14, 28, 32-33, 37 and 45 as follows:

B¹ 20. A process for the catalytic conversion of at least one reactant in a thermal chemical reaction, excluding deep oxidation, comprising:
passing at least one reactant into at least one reaction chamber;
said reaction chamber comprising a porous catalyst that catalyzes the reaction of said at least one reactant;
transferring heat to or from said at least one reaction chamber from or into at least one heat exchanger; and
obtaining at least one product from said reaction chamber;
wherein said porous catalyst comprises a metal support; and
wherein a contact time of the reactant is less than about 0.3 seconds, and the step of transferring heat, at steady state, transfers at least about 0.6 W/cc of total reactor volume, thereby suppressing slow reactions and the formation of at least one undesirable chemical reaction product.

B² 40. A process for the catalytic conversion of at least one reactant in a thermal chemical reaction, excluding deep oxidation, comprising:
passing at least one reactant into at least one reaction chamber;
said reaction chamber comprising a catalyst that catalyzes the reaction of said at least one reactant;
transferring heat to or from said at least one reaction chamber into at least one heat exchanger; and
obtaining at least one product from said reaction chamber;
wherein said step of transferring heat, at steady state, transfers at least 0.6 W/cc of total reactor volume, where total reactor volume is defined as the sum of the volume of

B²
the reaction chamber(s) and heat exchanger chamber(s) including the volume of chamber walls;

wherein a contact time of the reactant with the catalyst is less than about 0.3 seconds;

wherein a pressure drop through the reaction chamber is less than about 15 psig; and

wherein the catalyst comprises an interfacial layer on a porous support.

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A process for the catalytic conversion of at least one reactant in a thermal chemical reaction, excluding deep oxidation, comprising:

passing at least one reactant into at least one reaction chamber;

said reaction chamber comprising a catalyst that catalyzes the reaction of said at least one reactant;

transferring heat to or from said at least one reaction chamber from or into said at least one heat exchanger; and

obtaining at least one product from said reaction chamber;

wherein said step of transferring heat, at steady state, transfers at least 0.6 W of heat per cc of total reactor volume, such that, at steady state, the catalyst is maintained within a temperature range that reduces the formation of at least one undesirable chemical reaction product; and

wherein the catalyst comprises an interfacial layer on a porous support, and a thermal coefficient of expansion of the porous support is different from a thermal coefficient of the interfacial layer.

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B⁴
A process for the catalytic conversion of at least one reactant in a thermal chemical reaction, excluding deep oxidation, comprising:

passing at least one reactant into at least one reaction chamber;

said reaction chamber comprising a catalyst that catalyzes the reaction of said at least one reactant;

transferring heat to or from said at least one reaction chamber from or into said at least one heat exchanger; and

obtaining at least one product from said reaction chamber;

wherein said step of transferring heat, at steady rate, transfers between about 10 and about 100 W/cc of total reactor volume, such that, at steady state, the catalyst is maintained within a temperature range that reduces the formation of at least one undesirable chemical reaction product.

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33. A process for the catalytic conversion of at least one reactant in a thermal chemical reaction, excluding deep oxidation, comprising:

passing at least one reactant into at least one reaction chamber;

said reaction chamber comprising a porous catalyst that catalyzes the reaction of said at least one reactant;

transferring heat to or from said at least one reaction chamber from or into at least one heat exchanger; and

obtaining at least one product from said reaction chamber;

wherein said porous catalyst comprises a metal support;

wherein a contact time of the reactant is less than about 0.3 seconds, thereby suppressing slow reactions and the formation of at least one undesirable chemical reaction product; and

wherein the catalyst comprises an interfacial layer on a porous support, and a thermal coefficient of expansion of the porous support is different from a thermal coefficient of the interfacial layer.

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45. A method for suppressing formation of at least one undesirable chemical reaction product in a thermal chemical reaction, comprising:

passing at least one reactant into at least one reaction chamber;

said reaction chamber comprising a porous catalyst that catalyzes the reaction of said at least one reactant;

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transferring heat to or from said at least one
reaction chamber from or into at least one heat exchanger;
obtaining at least one product from said reaction chamber; and
maintaining a contact time of the reactant at less than 0.01 seconds, thereby
suppressing slow reactions and reducing the formation of at least one undesirable
chemical reaction products;

wherein the catalyst comprises an interfacial layer on a porous support, and
a thermal coefficient of expansion of the porous support is different from a thermal
coefficient of the interfacial layer;

wherein a catalyst material is deposited on the interfacial layer; and
wherein said porous catalyst comprises a metal support.

[Please add new claims 47-48 as follows:

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47. A process for the catalytic conversion of at least one reactant in a thermal
chemical reaction, excluding deep oxidation, comprising:

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passing at least one reactant into at least one reaction chamber;
said reaction chamber comprising a catalyst that catalyzes the reaction of
said at least one reactant;

transferring heat to or from said at least one reaction chamber into at least
one heat exchanger; and

obtaining at least one product from said reaction chamber;

wherein said step of transferring heat, at steady state, transfers at least 0.6
W/cc of total reactor volume, where total reactor volume is defined as the sum of the
volume of the reaction chamber(s) and heat exchanger chamber(s) including the volume
of chamber walls;

wherein a contact time of the reactant with the catalyst is less than 0.01
seconds; and

wherein a pressure drop through the reaction chamber is less than about 15

psig.

48. A method for suppressing formation of at least one undesirable chemical reaction product in a thermal chemical reaction, comprising:

- passing at least one reactant into at least one reaction chamber;
- said reaction chamber comprising a porous catalyst that catalyzes the reaction of said at least one reactant;
- transferring heat to or from said at least one reaction chamber from or into at least one heat exchanger;
- obtaining at least one product from said reaction chamber; and
- maintaining a contact time of the reactant at less than 0.01 seconds, thereby suppressing slow reactions and reducing the formation of at least one undesirable chemical reaction products;

wherein said porous catalyst comprises a metal support.